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ABSTRACT

When comparing the DACUM (Developing a Curriculum) and curriculum conference methods of curriculum development, one finds that the product goals of the two methods differ but the process goals are similar. Both seek to generate information from a select group on which to base curriculum development, but the end product of DACUM is a chart that displays tasks and duties of an occupation and the end product of a curriculum conference is the development of the main characteristics of a curriculum. Both methods use small groups of experts who are selected according to similar criteria that result in subjective selection. Decisions are made by reaching consensus. Documents are the main source of information at the conference but the practice and knowledge of participants are the chief sources of information with the DACUM method. With both methods, it is the leaders who are responsible for implementing the process and producing the final product. Extraneous variables may compromise the internal validity of the research designs used to study the two curriculum methods, including small sample size, nonrandom selection of participants, interaction between selection and the curriculum development method itself, interaction between selection and time, context factors such as whether the participants know one another, the Hawthorne effect, novelty effects, and effects of the leader. Validity of the studies could be helped by, among other things, randomizing the participants and standardizing implementation of the method as much as possible. (CML)

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METHODOLOGICAL ISSUES OF RESEARCH TO DACUM AND CURRICULUM CONFERENCE

(Are there really differences between the DACUM method and the curriculum conference)

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1. Introduction

The central question of this paper is: identify methodological threats of research to comparable curriculum methods DACUM and the curriculum conference.

The curriculum conference is an approach for developing curricula in groups in which representatives of relevant societal institutions participate science, education and business (Frey 1981,1982). The success of the curriculum conference is dependent on several conditions: the information report, the selection of participants and the process of decision making (Mulder, 1987). DACUM is an pragmatical approach to occupational analysis as basis for curriculum development. Norton (1986) identifies two critical factors for the success of the method. The first is to assemble a committee of eight to twelve experts in the area under study, and the second is to use a trained DACUM chairman. But what happens in the empirical field when a DACUM workshop or a curriculum conference are applied in a certain occupational field (flexible production, office automation, or publishing industry)? Are there really so many differences between a DACUM workshop and a curriculum conference?

This paper emphasizes the methodological aspects of research to DACUM and the curriculum conference. The second section describes the characteristics of the methods. Section three discusses the methodological implications of the chosen research design concerning curriculum methods. Section four is devoted to the external validity of research to the curriculum methods. Section five is focused on suggestions to reduce validity threats. The final section ends with a discussion.

2. Characteristics of the methods DACUM and the curriculum conference

In the following section we describe the characteristics aspects of the methods related to goals of the methods, selection of participants, decision making, role of the chairman and information sources. First we discuss the view of the founder of each method (Frey/Norton) on the specific characteristic, subsequently we discuss the common aspects of each characteristic and sometimes critics of certain aspects.

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Goals of the methods

The curriculum conference and the DACUM method have the following (product) goals: to develop main characteristics of a curriculum (Frey, 1981) and to develop a DACUM chart (a graphical portrait of duties and tasks involved in the job(s) or the occupation) which can be used as a basis for curriculum development (Norton,1985). Both methods have the same process goal to generate information of a selected group of persons. Participants of a curriculum conference or a DACUM workshop are confronted by feedback of information with subjective opinions of others. The produced information by the members of the committee is subjective and qualitative. The chairman attempts to reach agreement of all members. We can conclude that although the product goals are different, the process elements to reach the product goals have much in common.

The group of participants

A curriculum conference exists of twelve to thirteen persons. These persons are selected by general and specific criteria (see scheme 1, appendix). The final selection process takes place on the following way: the initiator presents criteria for the selection of the members to persons, who possess knowledge of persons in two of three fields (Frey, 1981). A DACUM committee exists of eight to twelve expert workers. These persons are selected by personnel and groups criteria (see scheme 1, appendix). The selection process progress as follow: the iniator contacts the companies that employ the type of expert workers needed and ask assistance for the selection of persons by the criteria and invites the potential persons for a DACUM workshop (Norton, 1985). The curriculum development process depends strongly on the composition of the group. The size group is usually small: 8 to 16 persons (see scheme 2, appendix). Both methods use criteria to select persons. The selection of possible persons is reduced by the circle of acquaintances or personnel of the selector. The selection process by the selector is dependent on a highly personal judgement. The participants take part on a workshop or conference on the basis of voluntarisness. Both methods advices too choose different persons for the role of chairman and iniator (organisator). To put it briefly, although the selection criteria are different, there are commonplaces concerning the use of selection criteria for the participants, the size of committee, the selection process.

Decision making

Rational argumentation is one of the characteristics of decision making during the curriculum conference (Frey, 1981). Decision making during a DACUM workshop is based on convincement (Norton, 1985). Both methods aimed to reach a certain degree of consensus of the members opinions. Yet, does rational argumentation really take place. The concept "rational argumentation" is rarely operationalized in terms of the kind of statements during the

process of decision making in the research papers and reports concerning the curriculum conferences. Mulder & Nijhof (1987) remark that during the discussions of the curriculum conference the participants frequently talked about the necessity, the level and the feasibility of the content aspects of the projected curriculum. This led to a less valid use of the procedure of information analysis, argumentation and decision making. They conclude on the reliability of the decision making procedure: Is it really true that differences between individual scores (same as opinion) can be eliminated by a rather short deliberation process. In a recent research study of Mulder and Brake (1989) concerning analysis instruments of decision making the conclusion has been made that analyzing decision making with respect to argumentation and interaction is very difficult. Decision making in both method are based on different theoretical concepts. The concept rational argumentation of the curriculum conference is difficult to assess in the emperical field for researchers.

Kind of information sources

The DACUM procedure considers the technical practice and knowledge of the occupational field as most important source (Norton, 1985). The information report is one of the main information sources of the curriculum conference (Frey, 1981). Yet do the participants use the information report? In the study of Mulder and Nijhof (1989) concerning the application of the curriculum conference in office automation and mechanical engineering, they claimed that although information materials were available ten days before the curriculum conference, a certain number of the participants did not read them. In short, stating the fact that not all the participants read the information material. The experience and knowledge of participants becomes one of the most important sources.

The role of the chairman

In the study of Frey (1981) the tasks of the chairman is viewed as follow: leads the curriculum conference, exemplary conduct, responsible not only for the process goals but also for the result, responsible for the necessary elements of the curriculum conference.

The DACUM procedure pays a lot of attention on the role of the chairman. The role of the chairman requires characteristics as skills in occupational analysis, a high degree of sensitivity to both verbal and non verbal communication. The procedures gives the chairman a lot of suggestions in the interpersonal field how to deal with a DACUM committee. The DACUM procedure advices persons who fullfill the role of chairman to follow a training for chairman.

The chairman has an important role in both methods. He implements the method. From a methodological point of a view the chairman can be seen as the person, who implements the treatment.

Scheme 1. Characteristics of the curriculum conference and DACUM

Characteristic	Curriculum conference	DACUM	Curriculum conference and DACUM
- goals of the method	- develop main characteristics of a curriculum	- develop a DACUM chart	- generate information of of participants
- group of participants	- 12/13 persons - general /specific selection criteria - application of general criteria by a field expert	- 8 - 16 persons - personal/group selection criteria - application of criteria by a field expert	- small groups - selection of persons by criteria - subjective selection process
- decision making	- rational argumentation	- convincement	- certain degree of consensus
- kind of information source	- main source information document	- main source practice and knowledge of participants	- practice and knowledge of participants
- the chairman	- responsible for process and product goals (result)	- responsible for product and process goals - requirements for the role of chairman - suggestions for the interpersonal interaction - training for the chairman	- chairman implements the method

3. Methodological implications of the chosen research design

In this last section we will discuss some methodological implications of research design, sample size and possible threats for the external validity. There are methodological threats with research to the process and product effects of the curriculum conference and DACUM. Sometimes these are consequences of the chosen research design and the specific requirements of the methods. In curriculum research to the methods the following designs are used : the one group posttest-only design, the one-group pretest-posttest design, and a combination of pretest-posttest with a measurement during the process.

3.1 The One-Group Posttest-Only Design

We can identify in the research of Rioseco (1988) a posttest on one group. There is only one posttest at the end or after the curriculum conference concerning the opinions of participants. The reason for this design is to identify the numeric value of the quality of the process of the eight curriculum conferences. We can identify two possible deficiencies on this design.

The first is the lack of pre-test measurement (observations) from persons receiving the method. As a result one can not easily infer that the treatment is related to the quality of the process.

The second is the implementation of the curriculum conference, which may differ from one chairman to another, if different chairmans are responsible for implementing the method. There may also be differences from one occasion to another occasion (heterogeneity/ homogeneity of job area, culture of the economic sector) when the same chairman implements the method.

3.2 The One Group Pretest-Posttest Design

Frey uses a pretest-posttest design in the Curriculum Conference Microprocessor to show the effect of the curriculum conference.

Die gemessene Veränderungen zeigen die Richtung an auf ein gewünschte Wert hin oder von ihm weg. Dadurch kan indirect geschlossen werden, daß der prozess in der Curriculum conferenz Wirkungen erzielt hat oder nicht.

(K. Frey,1981,pp 167)

Mulder (1987) intended to set up an pre post test with individual scores and subgroup and total scores during the conference. A comparison of these scores would serve as an indicator of the effect of the conference procedure. A comparison of these scores was not possible, the scoring procedure appeared to be interpreted differently by the conference members. The individual scores of the pre-test post-test design are subsequently analyzed for a comparative evaluation of the two conferences.

This pretest-posttest design is an improvement on the design on Rioseco. There are measurements before and after the treatment.

We can identify the following weaknesses on this design.

The first is that changes on the post test could be due on history. In the sense that a certain external event during the conference of workshop can influence (leadership of the chairman, dominant participants or external experts) the respondent's opinion on the post-test. We do not know whether or not they have operated, whether or not they have affected the measurements. Cook and Campbell (1979) argue that these designs are normally not sufficient for permitting strong tests of causal hypotheses because they fail to rule out a number of plausible alternative interpretations.

An other possible threat could be a differential lose of respondents on the post test (mortality).

3.3 Combination of a One Group Pretest-Posttest with a measurement during the process

In the study of Mulder and Thijsen (1989) three measurements points concerning the opinions of participants were performed:

1. before or at the beginning of the conference an individual measurement
2. during the curriculum conference a measurement concerning the group decision
3. after the conference an individual measurement

They looked at opinion shifts of participants that are related to group positions regarding curriculum design specifications. These opinions shifts are considered as result of the decision making process regarding curriculum design specifications. Goal of this inquiry was to explore the differences in opinions between curriculum designers before they begin their task of designing a specific curriculum, the amount of convergence that is caused by curriculum deliberation, and the preservation (or retention of that convergence.

In this design there is also the plausibility of extraneous variables beside the curriculum deliberation which could influence the scores of the participants. Possible extraneous variables could be the number of verbal dominant persons during the conference, the possible relations between the persons, the influence of the person's status in the hierarchic order. However, to test a causal relation between curriculum deliberation and convergence of opinions a stronger design is necessary.

An other possible threat could be a differential lose of respondents on the post test (mortality).

In short: all these designs are weak because extraneous variables may jeopardize the internal validity of the design. In the last section we will discuss an possible solution for the weaknesses of the mentioned designs.

Scheme 2: Overview of the Designs of the Research Projects

Sort of design	Research projects (researchers)	
1. One Group Post Test Only X O	Curriculum conference areas for technical education Rioseco, 1987	
2. One Group Pretest-Posttest X1 O X2	Curriculum Conference Area Microprocessor Frey, 1981	Curriculum Conference Flexible production office/sales automation Mulder & Nijhof,1987
3. One Group Pretest(process test) PostTest X1 O-X2 X3	Curriculum Conference Area Practical Vocational skills Adult Education Mulder & Thijsen, 1989	

4. External validity of research to the curriculum methods

In the next section we discuss the following forms of external validity: population validity and ecological validity. We describe first threats of population validity and then possible threats of ecological validity. The population validity can be jeopardize by the following threats small sample, select sample, a possible interaction between selection and treatment and the interaction.

Sample size

The samples are often small and can introduce sampling bias into the study. How representative is the sample for the population. In most studies the following categories are inadequate represented: women and persons of small businesses (Mulder,1987; Frey 1981, Mulder & Thijsen; Hesse & Nijhof, 1988).

Select sample

Both methods don't use a randomized assignment of persons. Nor is there a matching of persons and then random assignment. They select persons on the basis of criteria. Both methods use an implicit criterion voluntarism. The population is in fact the peoples who offer to volunteer beside the explicit criteria.

Interaction selection and treatment

Another threat of population validity is the interaction of selection and treatment (method). The superiority of one conference (treatment) over another could be reversed when participants at different levels of educational levels are exposed to the conference. Scheme 2 (appendix) shows that the selected participants have a high level of education. There could also be an interaction of the method with the kind of jobs of participants fulfill. Participants fulfill often management jobs (see scheme 2, appendix). The general characteristics of managers according to Miller (1989) are the following:

Plan & direct work of a department, company or organization. Considers how aims can be best achieved and decides what resources are need (money, people, equipment). Plans budgets and time scales, organizes daily running and keeps staff informed/enthusiastic. Measures progress, adjusts procedures if necessary.

The characteristics of this job in relation to other jobs demands more skills on the level of decision making and persuade other persons in favour for certain decisions and choices. In short there could be an interaction between personality variables and treatment (the method)

Possible hypotheses

Hypothesis 1: The higher the educational level of the participants of conference the higher the score on argumentation for the group during the performance of curriculum conferences

Hypothesis 2: The more managers take part on the conference how higher the score on argumentation for the group during the conference.

Interaction selection and time

This could also be a threat, in the study of Frey (1981) a short period of time for nomination influenced the selection *of participants. Die proportionaler Beteiligung von Männer und Frauen is bei der Gebiet Mikroprozessor nicht gelungen. Dies mag an verschiedene Grunden liegen. Einer ist sicher der zu kurz angesetzte Zeitraum fur die Nominierung und Auswahhl von Teilnehmer (Frey*, 1981, pp. 159).

The following sections concern the ecological validity. Are the results of the methods generazible to other contexts, to other situations? We have identified the following threats: specific context factors, hawthorne effect, novelty effect and experimental effect

Specific context factors

If the participants of the methods each other don't know, would the results be generalized in a situation where they know each other. Would the results be the same?

Hawthorne effect

In the study of Mulder (1987,1989) and Hesse (1988, 1989) the participants are aware of participation of a research. They have to fill out questionnaires before and after the method and their behaviour during the conference of workshop is registered on (video) tape. The conference or workshop is organized in a room with audio-visual instruments (e.g. microphones, cameras, spots) and researchers as observants. The participant's awareness of participating on a research may precipitate behaviour which would not occur in a more natural setting. An other obvious example:

*"Ein other Mitgleid doppelt nach und kommt sich wegen der Neuartigkeit der Curriculumarbeit und der Anwesenheit des Iniators in d*er Kaninchen Rolle vor (Frey, 1981, pp. 38).

Novelty effects (novelty effect of the method (treatment))

The results may be due partly to the disruption (above mentioned example) or enthusiasm (see the example below) generated by the ne*wness of the method*

*Einige Teilnehmer stellen fest, dass sie hier besondere Erfahrungen machen und zu besondere Handlungsformen angeleitet werden. Anderen weisen auf die Neuartigkeit der konferenz hin (*Frey, 1981, pp. 35)

Experimental effects

The behavior of the participants may be unintentionally influenced by certain behavior of the experimenter. By observation of the participant behaviour the researcher may bias the administration of the treatment. In Frey 1981 we find examples in which the initiator (researcher) influences the method. The participants of conference want to have clearness of the goals of the conference method from the iniator. In the research of Mulder (1987) the person who is the initiator is also the chairman and researcher.

Scheme 3: Identification of validity threats (a minus indicates lack of control and a question mark a possible source of concern)

	Level of validity threat
History (external event)	-
Mortality (non response post test)	?
Select sample	-
Interaction time and select sample	?
Interaction of selection and treatment	-
Hawthorne effect	-
Novelty effect	?
Experimental effect	?

5. Recommendations to reduce validity threats

In the following sections recommendations to reduce the validity threats will be given. The recommendations concern the selection process, the updating of the reliability of the implemented method, the extraneous variables and the research design.

A suggestion to make the selection process more objective could be the following:

step 1. ation (lists addresses of all persons on paper).

step 2. perform a pre inquiry by a survey, where the selection criteria are operationalized

step 3. assess which persons fullfill the requirement

step 4. random assignment of persons

The second suggestion concerns the updating of the reliability of the implemented method. A possible solution is: make the method and implementation as standard as possible. An effort to standardize the method could be reach by a handbook of the method and a training for the chairman.

The third suggestion concerns the threat of extraneous variables. A solution could be randomized matching of persons. Match individual persons on as many extraneous variables (education level, job level) as possible, which might effect the dependent variable and then to use random procedure to assign the members of the matched pairs to the curriculum conferences. Matching can be very useful in studies where small samples are used.

The fourth suggestion concerns the research design.

The main criterion of an adequate research design can be expressed in the following question: does the design adequately answer the research question. An often formulated research question in the research of the curriculum conference is: does the curriculum conference effects the dependent variables? Stronger designs are necessary to assess adequately changes on the dependent variables. A quasi experimental design where possible extraneous variables are controlled with a covariance analysis could be a solution.

6. Discussion

DACUM and the curriculum conference involve a small, upper crust group for the development of a curriculum. A group which include mainly men, with a high educational level, with a high job level, representatives of companies with a big size of business. Certain groups (minorities, women, persons with a low educational level) of the society are enclosed concerning the development of a curriculum. It could be useful to legitimate the developed product by a representative sample of persons inve sample of persons in an occupational (education/business) field.

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Appendix 1

Scheme 1: Selection criteria used in the curriculum conference (CC) and DACUM workshop

	Selection criteria	Recommendations
Frey 1981 (CC)	General criteria (3) - participant proves himself by systematic considerations about his area of work with reference to education - participant invests his main competency in interaction with groups of people outside the field - participant has been engaged in the realization of elementary educational goals Secondary (specific) criteria (5) - participant studies questions concerning the general education - participant has concerned himself with all the connections between individual and social developments together with education and technology or science - participant knows various infrastructures and subareas in connection with the occupational field - participant works with the distribution or reproduction of micro-processor technology or with know how in the various functions - participant has been tested by professional work with individual or group self realization within the frame of organized learning processes.	- Students should know each other before the conference - Equal participation of man and women - The role of the initiator of CC should be clear - The initiator should not take part on the conference
Mulder & Nijhof 1987 (CC)	criteria - different economic sectors - company size - job categories - rate of automation (pp 18)	Other criteria Are also important, like job knowledge, subject knowledge group and communication skills, but difficult to test
Hesse & Nijhof 1988 (DACUM)	Personal criteria - Experts in the jobs to be analyzed - Full time employment in a job - Occupational representativeness - Freedom from bias to training issues - Full time commitment (devotion) to the the DACUM workshop Group criteria - Persons should be reasonable spread with regard to sex - Persons should be reasonable spread with regard to the region - Persons should be reasonable spread with regard to the size of business	

Scheme 2: Characteristics of the Selected Persons (members) at the curriculum conference (CC) and the DACUM workshop

Frey '81	**Occupational field**	**Mikroprozessor**
(CC)	Group size	12 persons (without experts)
	Age	a range of 21 to 65
		mean age 37 years
	Sex	10 men and 2 women
	Educational level	6 graduate
		6 undergraduate
	Economic sectors	9 persons educational system
		3 persons business/industry
	Management jobs	5 persons
	Students	3 persons
Mulder 87	**Occupational field**	**Flexible Production Automation**
Nijhof	Group size	13 persons
(CC)	Sex	all men
	Age	in a range of 33 till 55
	Mean age	mean age 43 years
	Educational level	six undergraduate
	Economic sector	7 from the educational system
		6 from the business system
	Management jobs	10 persons
	Student	none
	Occupational field	**Office and Sales Automation**
	Group size	12 persons
	Sex	9 men and 3 women
	Age	age between 33 and 50
	Mean age	43 years
	Economic sector	6 from the educational system
		6 from business organizations
	Management jobs	6 persons
	Students	none
Hesse '88	**Occupational field**	**Booktrade**
Nijhof	Group size	11 persons
DACUM	Sex	9 men 2 women
	Age	in a range of 34 to 44
	Mean age	39 years
	Educational level	2 graduates
	Economic sector	11 persons in business
	Management jobs	8 persons
	Students	none
	Occupational field	**Publishing Industry**
	Group size	9 persons
	Sex	7 menmen
	Age	in a range of 35 to 58
	Mean age	44 year
	Educational level	4 graduates
	Economic sector	9 persons
	Management jobs	9 persons
	Students	none